

### **What is Claimed is:**

1. A high transmittance sub-wavelength structure polarization module, comprising:

- 5 a transmission substrate, having a top surface and a bottom surfaces, said top surface being composed of a plurality of projecting parts and a plurality of sunken parts, wherein said sunken part has a first sub-wavelength structure disposed thereon and said projecting part has a second sub-wavelength structure disposed thereon; and
- 10 a plurality of collimation units, being disposed at the bottom surface of said transmission substrate corresponding to said projecting and sunken parts of said top surface;

wherein said collimation unit is capable of collimating a light into the position of said corresponding sunken part.

- 15 2. The polarization module of claim 1, wherein a light source is arranged beneath said collimation unit for providing said light, and said light composed of a first-polarized light and a second polarized light.
3. The polarization module of claim 2, wherein said first sub-wavelength structure is one of the following: a ladder structure consisted of a plurality of first grates of different widths and height and a grating structure consisted of a plurality of first grates of different widths, capable of separating said first and second-polarized light and diverting the direction of said second-polarized light so as to allow said first-polarized light to pass through the same and divert said second-polarized light to said projecting parts of said top surface.
- 20 4. The polarization module of claim 3, wherein the measures of said first grate are smaller than the wavelength of said light.
5. The polarization module of claim 4, wherein said second sub-wavelength structure is composed of a plurality of second grate of the same width forming a polarization retardation element capable of delaying the phase of said light by 90 degree.
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6. The polarization module of claim 5, wherein the measures of said second grate are smaller than the wavelength of said light.
7. The polarization module of claim 1, wherein said transmission substrate is made of a transparent polymer material.
- 5 8. The polarization module of claim 6, wherein said substrate can be made of a material different from that of the first grate and the second grate.
9. The polarization module of claim 5, wherein said first and second grate are lump grates.
- 10 10. A high transmittance sub-wavelength structure polarization module, comprising:
  - a transmission substrate, having a top surface and a bottom surfaces, wherein said top surface has a dual-layer sub-wavelength structures that the lower layer has a first sub-wavelength structure and the top layer has a second sub-wavelength structure;
  - 15 wherein said bottom surface has a plurality of collimation units, arranged corresponding to said dual-layer structure of said top surface, capable of collimating a light into the corresponding position of said lower layer.
- 20 11. The polarization module of claim 10, wherein the positioning of said first sub-wavelength structure and said second sub-wavelength is one of the following: independently lined-up by oneself corresponding to the other or interlaced with each other.